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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/527,748	11/07/2005	Nigel Seddon	038665.56036US	9170

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EXAMINER

LE, TUNG X

ART UNIT	PAPER NUMBER
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2821

DATE MAILED: 05/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	<b>Application No.</b> 10/527,748	<b>Applicant(s)</b> SEDDON ET AL.	
	<b>Examiner</b> Tung X. Le	<b>Art Unit</b> 2821	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 07 November 2005.
- 2a) ☐ This action is **FINAL**.
- 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 16-34 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 16-34 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1. ☒ Certified copies of the priority documents have been received.
- 2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
- 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

*Hoanganh Le*  
**Hoanganh Le**  
**Primary Examiner**

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
 Paper No(s)/Mail Date 03/14/2005, 11/07/2005.
- 4) ☐ Interview Summary (PTO-413)  
 Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### DETAILED ACTION

1. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification. Thus, claims 1-15 are now cancelled and claims 16-34 are currently presented in the instant application.

#### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 16-19, 21-26, 30, and 32-33 are rejected under 35 U.S.C. 102(e) as being anticipated by Diaz et al. (U.S. 6,512,494 B1).

Regarding claim 16, Diaz discloses a periodic electromagnetic structure (figures 8-9, elements [800,900]) comprising an array (column 9, lines 1-9) of conducting LC elements (figure 15) in combination with a frequency-dependent dielectric (column 5, lines 52-59) whose permittivity and/or permeability varies according to the frequency of radiation incident thereon such that the resonant frequency of the LC elements follows the frequency of the incident radiation (column 7, lines 38-49).

Regarding claim 17, Diaz discloses that the frequency-dependent dielectric has a response to incident radiation such that the product of the permittivity and permeability

of the dielectric varies in proportion to the reciprocal of the square of the frequency of the incident radiation (column 14, lines 62-67).

Regarding claim 18, Diaz discloses that the frequency-dependent dielectric has a response to incident radiation such that the permittivity of the dielectric generally varies in proportion to the reciprocal of the square of the frequency of the incident radiation (column 14, lines 62-67) and the permeability of the dielectric is substantially constant (column 15, lines 20-26).

Regarding claim 19, Diaz discloses that the frequency-dependent dielectric has a response to incident radiation such that the permeability of the dielectric generally varies in proportion to the reciprocal of the square of the frequency of the incident radiation (column 14, lines 62-67) and the permittivity of the dielectric is substantially constant (column 17, lines 55-58).

Regarding claim 21, Diaz discloses in figure 8 that the LC elements are protrusions from a flat conducting plate (806).

Regarding claim 22, Diaz discloses that the frequency-dependent dielectric abuts the conducting plate (806) and the protrusions extend at least partially into the dielectric (figure 10).

Regarding claim 23, Diaz discloses that the protrusions are generally thumb tack shaped (figure 11).

Regarding claim 24, Diaz discloses that the structure forms an ultra compact photonic bandgap structure (page 2, see M. Rahman and M.A. Stuchly "Equivalent circuit model of 2D microwave photonic bandgap structure").

Regarding claim 25, Diaz discloses that the structure forms a split ring resonator (figure 8).

Regarding claim 26, Diaz discloses that the LC elements are disposed across the surface of the frequency-dependent dielectric (figure 9).

Regarding claim 30, Diaz discloses that the structure forms a high-impedance surface (column 5, lines 50-52).

Regarding claim 32, Diaz discloses that an antenna comprises a periodic electromagnetic structure (column 5, lines 50-54).

Regarding claim 33, Diaz discloses that a mobile phone handset comprises an antenna (column 6, lines 7-12).

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Diaz et al. (U.S. 6,512,494 B1) in view of Green (U.S. 4,818,963).

Regarding claim 20, Diaz discloses every feature of the claimed invention, excluding a ferrite material.

Green discloses a ferrite material type (figure 8) in order for reducing a size and a low cost for an array antenna (see abstract).

Since one of ordinary skill in the art would recognize the benefit of reducing a size and a low cost of an array antenna, it would have been obvious to provide Diaz with a ferrite material type built on an array antenna as taught by Green.

6. Claims 27 - 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Diaz et al. (U.S. 6,512,494 B1) in view of Varadan et al. (U.S. 6,525,691 B2).

Regarding claims 27 and 29, Diaz discloses every feature of the claimed invention, excluding chiral conductors.

Varadan discloses chiral conductors in order for improving a wide band operation and a low loss characteristic of an array antenna (column 3, lines 45-50).

Since one of ordinary skill in the art would recognize the benefit of improving a low loss and a wide band antenna, it would have been obvious to provide Diaz with chiral conductors employed in an array antenna as taught by Varadan.

Regarding claim 28, the combination of Diaz and Varadan disclose that the chiral conductors are helical (see Diaz, figures 8 and 15).

7. Claims 31 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Diaz et al. (U.S. 6,512,494 B1).

Regarding claims 31 and 34, Diaz discloses all of the claimed subject matter, as expressly recited in claim 16, except for specifying that the surface impedance having a substantially  $377 \Omega$ . However, such the value of the surface impedance of  $377 \Omega$  is not patentable merits since the impedance value can be selected as a design choice and it would have been obvious to a person skilled in the art.

***Citation of Relevant Prior Art***

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Sanchez et al. (U.S. 6,917,343 B2) discloses a broadband antennas over electronically reconfigurable artificial magnetic conductor surface.

Diaz et al. (U.S. 6,670,932 B1) discloses a multi-resonant, high-impedance surfaces containing loaded-loop frequency selective surfaces.

Sievenpiper et al. (U.S. 6,552,696 B1) discloses an electronically tunable reflector.

Sievenpiper et al. (U.S. 6,538,621 B1) discloses a tunable impedance surface.

Wilhelm et al. (U.S. 2003/0142036 A1) discloses a multiband or broadband frequency selective surface.

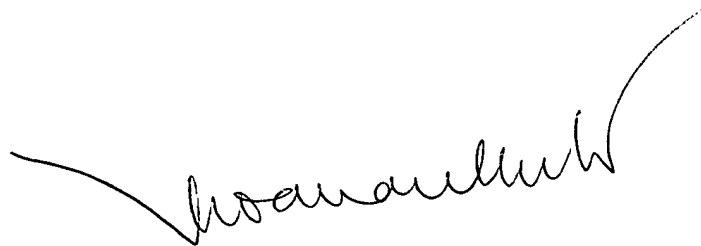
***Inquiry***

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tung X. Le whose telephone number is 571-272-6010. The examiner can normally be reached on 8:30 AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Callahan can be reached on 571-272-1740. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Examiner  
Tung Le  
AU 2821  
May 16, 2006

A handwritten signature in black ink, appearing to read 'Hoanganh Le', with a long, sweeping horizontal line extending to the left.

**Hoanganh Le**  
**Primary Examiner**